



## The effect of data structure and model choices on MFA results: A comparison of phosphorus balances for Denmark and Austria



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### ABSTRACT

Material Flow Analysis (MFA) studies for a particular substance often exist for several different countries or regions, but share a similar goal and scope. In direct comparisons of such regional resource budgets, the importance of the choices made in establishing an MFA system tends to be disregarded.

We identify and quantify the effects of choices made in system layout, data material and uncertainty assessment on the outcome of regional MFAs using two recent country-scale MFAs (of Denmark and Austria) of phosphorus as a case study.

We highlight the differences in system boundaries and definition of flows and processes. We quantify types and choice of data sources; analyse the consistency of the data used by looking at the extent of data reconciliation, as a measure of model quality; quantify the effect of different approaches to uncertainty assessment; and show the influence of aggregating/disaggregating flows.

We show that differences in system layout are mostly attributable to varying goals and scope definitions. Direct comparison of uncertainties across studies is problematic: both studies draw on similar types of data sources, yet they show very different uncertainty assessments; the uncertainty assessment in MFA is always subjective to a certain extent. We demonstrate that reconciliation of conflicting data provides a useful measure to assess data consistency and model quality: data are more consistent (5% average change in reconciled data) in the Austrian than in the Danish (9%) case. We suggest an iterative approach to uncertainty assessment. Likewise, we demonstrate the effect of the aggregation of flows on model uncertainty.

These findings quantify and emphasise the importance of examining MFA studies' metadata and suggest an approach to be followed when drawing on such studies as a source of information.

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